Table I. *H-thymidine incorporation rate (i.e., mean incorporation value in cell nuclei of irradiated samples minus mean incorporation value into corresponding nonirradiated cells); shown as grains/nucleus; s = ± S.E.M.

<table>
<thead>
<tr>
<th>Cell layer</th>
<th>In vivo experiments</th>
<th>In vitro experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canglion</td>
<td>2.08 ± 0.54</td>
<td>n.s.</td>
</tr>
<tr>
<td>Inner nuclear</td>
<td>1.38 ± 0.24</td>
<td>n.s.</td>
</tr>
<tr>
<td>Outer nuclear</td>
<td>0.154 ± 0.027</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

s. = Significant difference, n.s. = no significant difference.

The visual evoked response to stationary checkerboard patterns in children with strabismic amblyopia. U. Yinon, L. Jakobovitz, and E. Auerbach.

The visual evoked potential (VEP) to stimulation with stationary checkerboard patterns was studied in children with strabismic amblyopia; normal subjects were used as controls. The wave form of the VEP to patterned stimulation differed characteristically from that obtained with non-patterned stimulation. It was also slightly different in shape after stimulation of the amblyopic eyes in comparison to the normal fellow's eyes. Amplitudes in the normal eyes of amblyopes were found significantly higher ($p = 0.003$) and latencies significantly shorter ($p = 0.004$) than in the amblyopic eyes. The mechanism responsible for the dysfunction in neural processing of patterns as well as the site affected in strabismic amblyopia are discussed.

The visual cortex is functionally organized in classes of cells serving as edge, orientation, and motion detectors. The processing of the response by these cells of various image qualities enables pattern discrimination. Partial or complete loss of pattern specificity is the main effect in strabismic amblyopia. Other visual functions such as spectral and brightness sensitivity appeared to remain essentially normal in amblyopes.
Previous reports on the visual evoked potential (VEP) to pattern stimulation in amblyopic humans are not in perfect agreement. While only changes in wave form were found by Lombroso, Duffy, and Robb, Spekreijse, Khoe, and van der Tweel found a decrease in the amplitude. Both investigators used a checkerboard pattern as a stimulation.

In the present study, changes in the VEP, elicited by stationary checkerboard pattern, will be shown in subjects with strabismic amblyopia. The VEP was recorded in four children, between 11 and 16 years of age, with strabismic amblyopia. Visual acuity of all the normal eyes was between 6/7 and 6/9 and of the amblyopic eyes 6/60. Funduscopy was normal in both eyes. Eight emmetropic adult normal subjects served in order to compare their wave form of the VEP with that of the amblyopes. The difference in age between the normal and the strabismic subjects could be neglected because in the present study only the difference between responses of the normal and amblyopic eye of each subject was considered when statistically analyzed.

The light source consisted of a stroboscope connected to a photostimulator (Grass Instrument Co., PS-2) provided an approximate flash intensity of 375,000 candle power and a flash duration of about 10 μsec. It was fixed two meters away from a tangent screen and above a subject who was sitting one meter in front of the screen. The tangent screen subtended at the eye an angle of 27.5° and exhibited a stationary checkerboard pattern (Fig. 1). Check sizes subtended to the eye 0.69°, 1.38°, 2.76°, and 5.52° were used. The most effective check size in stimulation with the stationary checkerboard pattern was in the region of 10 to 20 minutes of arc. However, we were interested in the present study only in differences between patterned and nonpatterned stimulation and in differences between the amblyopic and normal eye to the pattern presented. In order to achieve accommodation of the eye on the stimulus pattern a fixation light of 0.01 foot candles was located at the center of the screen, with angular subtense of 0.29°.

Monopolar recordings were made between two silver-disk electrodes, 9 mm. in diameter, the active one was placed on the inion and the indifferent on the midvertex.

The VEP of a normal subject produced by checkerboard stimulation is characterized by a positive component which usually contains two waves with peaks at 80 and 110 msec., followed by a negative wave at 150 msec. (Fig. 1). The wave form of the response evoked by the checkerboard stimulation differed from that evoked by uniform illumination. In one normal subject produced by checkerboard stimulation is characterized by a positive component which usually contains two waves with peaks at 80 and 110 msec., followed by a negative wave at 150 msec. (Fig. 1). The wave form of the response evoked by the checkerboard stimulation differed from that evoked by uniform illumination. In one normal subject, the relative change in the VEP amplitude to the various check sizes on the one hand, and to a white surface on the other hand, was consistent in eight different tests which were carried out within a few months.

After determining the VEP wave form and
amplitude to stationary checkerboard stimulation of various sizes of its elements in normal subjects, this method was applied to the VEP in children with strabismic amblyopia. Although the VEP from stimulation of the amblyopic eye displays the same main components as that from the other good eye, and in control subjects, small changes in wave form were found. As an example of this difference of the VEP’s in amblyopes, the normal eye in one subject consistently produced a sharp and high first-positive wave while the amblyopic eye with the same stimulus produced a larger second-positive wave.

Fig. 2 shows that the amplitude in the VEP of the amblyopic eye is much lower than that of the good eye. Despite some variability of the amplitude data from all the amblyopes investigated, they were significantly higher (p = 0.003, n = 28) after stimulation of the normal eyes (mean: 17.8 \( \mu \)V) than in the amblyopic ones (mean: 14.5 \( \mu \)V). Peak latencies were shorter after stimulation of the normal eyes than of the amblyopic eyes (p = 0.004).

The results of the present study confirm those of Lombroso, Duffy, and Robb in that there are changes in wave-form complexity in the VEP’s from the amblyopic and the normal eye. Moreover, in addition to this we found a significant decrease in the amplitudes and lengthening of the latencies in VEP’s from stimulation of the amblyopic eye compared to the nonamblyopic fellow eye. We did not obtain continuous increase in the VEP amplitude with check size as demonstrated in the one amblyope examined by Spekreijse, Khoe, and van der Tweel. This may be attributed to the different experimental conditions.

Dawson, Perry, and Childers also found significant differences between VEP’s produced by normal and amblyopic eyes. They calculated the ratio between the response to Moiré patterned and nonpatterned stimulation as function of the refractive value added to each eye. In two out of the three amblyopes with strabismus who were examined, they showed a maximum response in the VEP from the normal eye at a given refraction, but not from the amblyopic eye. This is consistent with our findings.

Although our results indicate that neural connections processing pattern vision are affected in amblyopia, the problem of the site of those changes is still not solved. The visual cortex may be involved because of the reduced VEP through the amblyopic eye despite normal ocular media. However, the possibility that retinal changes occur is supported by a recent finding of Lawwill and co-workers who showed, by means of the VEP, that in order to inhibit the central area a larger surround (25 min. of arc) is needed in the amblyopic eye than in the normal eye.

**Fig. 2.** Monocular responses of an amblyopic child to checkerboard patterns. The amplitude and latency data are given according to the appropriate peaks of the VEP (numerals 1 and 2 which were also used for the statistical analysis); a typical VEP is seen at the top of the figure. Calibrations: 10 \( \mu \)V and 100 msec.; two tests were carried out for each eye, each consisting of 50 averaged responses. Normal eye O-O; Amblyopic eye O-O. Visual acuity of the normal eye was at least 6/7.5 and of the amblyopic eye 6/60.
An evaluation of the pilocarpine Ocusert.*

DAVID M. WORTHEN, THOM J. ZIMMERMAN, AND CHIEL A. WIND.

Forty patients with open-angle glaucoma who were responsive to pilocarpine have been studied for up to eight months regarding their response to the use of the pilocarpine Ocusert with a delivery rate of 20 micrograms per hour. Using pilocarpine drops, the 40 patients had a mean intraocular pressure of 20.7 plus or minus 5.6 mm. Hg. When the pilocarpine was discontinued their pressure rose to a mean of 25.6 plus or minus 3.9 mm. Hg. Using a pilocarpine Ocusert, mean pressure was reduced to 19.5 plus or minus 3.9 mm. Hg on both a short- and long-term basis. The reduction in pressure with use of the Ocusert is significant with a p-value of less than 0.01. Subjectively, the patients responded that they preferred the Ocusert system to pilocarpine drops. No side effects from the Ocusert have been noted.

Armaly and Rao 1 have reported on the short-term effects of pilocarpine drops versus pilocarpine Ocusert on intraocular pressure and pupil size. In another paper they reported the response of intraocular pressure to various release rates. 2 The purpose of this report is to share our experience over an eight-month period of time in the treatment of 40 patients with the pilocarpine Ocusert. The theoretical advantages of the Ocusert system would include: (1) round the clock pressure protection from elevated pressure, (2) less miosis, (3) reduced untoward side effects associated with transient overdose, and (4) possible greater patient compliance with a drug regime.

Methods and materials. The Ocusert is a polylaminated structure utilizing a diffusional process for drug delivery. Pilocarpine-free base diffuses through the copolymer membrane at a predetermined rate. Fig. 1 is a diagram of an Ocusert showing its construction and dimensions.

Forty patients were selected from the Glaucoma Clinic of the Veterans Administration Hospital, Gainesville, the Eye Clinic of the University of Florida, and the Eye Clinic at the University of Jacksonvile Hospital. The patients were known to be responsive to pilocarpine (generally 2 per cent) and had not had: recent surgery, infections, or inflammatory conditions; optic neuropathy; retinal detachment; severe abnormalities of the lids, conjunctiva, cornea, or lens; diabetic retinopathy; or macular lesions. At the initial visit the history and general physical findings were recorded. The pressures recorded were at various times after pilocarpine administration, but not less than four hours. Three days later, slit-lamp examination, ophthalmoscopy, tonometry, visual field acuity, perimetry, and gonioscopy were performed. The patient continued off medication and was seen two days later, at which time the visual acuity,


2. Pettigrew, J. D., Nikara, T., and Bishop, P. O.: Responses to moving dots by single units in cat striate cortex, Exp. Brain Res. 6: 373, 1968.


